CANDIDATE'S NUMBER
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~~Tests~~
~~D-2~~
Biology 30
Aug., 1968

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HIGH SCHOOL AND UNIVERSITY MATRICULATION

EXAMINATIONS BOARD

DEPARTMENTAL EXAMINATIONS, 1968

AUGUST

BIOLOGY 30

Value — 150 marks.

Time — 2 hours.

Note—This examination consists of two sections:
Section A — Each candidate must DO ALL questions in Section A.
Section B — Each candidate may choose any THREE of the five questions in Section B.

SECTION A

Answers to questions 1 to 90 are to be machine scored. Record your answers on the separate answer sheet provided. Each question has four suggested answers, one of which is better than the others. Select the BEST answer and record it as shown in the example below.

EXAMPLE	ANSWERS	ANSWER SHEET
In the following list an example of a warm-blooded animal is a	A. grasshopper B. earthworm C. dog D. fish	A B **C** D E DISREGARD COLUMN "E" ON THE ANSWER SHEET

Use an ORDINARY HB pencil to mark your answers on the answer sheet. Make certain your answer marks are heavy and black. If you change your mind about an answer, be sure to erase your first mark completely. There should be only one answer marked for each question. Be sure there are no stray pencil marks on your answer sheet.

Write your name and school in the space provided on the answer sheet.

Do not write your name on this booklet.

SECTION B

Answers to questions in this section are to be recorded in this test booklet.

Rough work may be done in pencil; finished work must be done in blue or black ink (pen or ballpoint). All diagrams should be done in BLACK pencil.

DO NOT FOLD EITHER THE ANSWER SHEET OR THE TEST BOOKLET.

ce your answer sheet BEHIND the test booklet and INSERT BOTH THE SAME ENVELOPE in such a way that the UPPER LEFT HAND RNER OF THE BOOKLET (Candidate's Number) shows through the ASHED CORNER of the answer envelope.

SURE TO SEAL THE ENVELOPE.

Machine Score
Booklet Score
Final Score

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Questions 1 to 90 l ase select the BEST of the four answers and r er sheet provided.

1. Brownian movemer g salt balances
collisions

2. Seed plants form t not gametes
two sizes
ndent gametophyte
but not gametophytes

3. The intestine is
system
ism

4. The nucleolus RNA
ell activities
DNA
espiration

5. Protein coagulation is

5. A. caused by heat
B. reversible
C. separation into amino acids
D. temporary

6. In cells the most abundant element by weight is

6. A. N
B. H
C. O
D. C

7. Grana occur in the

7. A. nucleus
B. mitochondrion
C. Golgi body
D. chloroplast

8. When a drop of stained water is added to 2 ml. of olive oil in a test tube and shaken

8. A. the olive oil forms the continuous phase
B. water forms the continuous phase
C. phase reversal occurs when you shake the emulsion
D. the emulsion becomes stabilized

9. Ribosomes (microsomes)

9. A. contain DNA
B. play a role in the mechanics of cell reproduction
C. are the sites of protein synthesis
D. do not occur in plant cells

10. The pungent odor characteristic of acrolein indicates the presence of

10. A. fatty acids
B. glucose
C. amino acids
D. glycerin

11. The specificity of DNA resides in

A. the sequence of the phosphate-sugar components
B. its protein
C. the sequence of the purine-pyrimidine components
D. the number of nucleotide components

12. In protoplasm the only reducing substances of importance are

A. esters
B. ketones
C. amides
D. benzenes

13. A cell will swell if the external medium is

A. hypotonic
B. hypertonic
C. isotonic
D. more concentrated than the interior of the cell

14. Insulin promotes the transformation of

A. glucose to glycogen
B. glycogen to glucose
C. a normal person into a diabetic
D. sugar-containing urine into normal urine

15. The major factor in phloem translocation is

A. osmosis
B. diffusion
C. guttation
D. transpiration

16. In order to carry out a reflex act a frog must have

A. a spinal cord
B. a spinal cord plus a cerebral cortex
C. a spinal cord plus a medulla oblongata
D. an intact central nervous system

17. The step in photosynthesis which requires light is the

A. ionization of chlorophyll
B. transport of hydrogen to TPN
C. regeneration of chlorophyll
D. transfer of electrons from chlorophyll to cytochrome

18. An example of an emulsifying agent is

A. potassium iodate
B. sodium chlorate
C. bile salts
D. potassium hydroxide

19. The absorption of fats

A. takes place in the large intestine
B. is primarily into the ducts of the lymphatic system
C. is into the capillaries of the small intestine
D. requires that they be broken down completely to fatty acids and glycerin

20. The liver is able to deaminate

A. proteins
B. polysaccharides
C. amino acids
D. fatty acids

21. Bile is produced in the

21. A. liver
B. gall bladder
C. kidney
D. spleen

22. When fats are absorbed from the gut, they must be in the form of

22. A. glycerin and fatty acids
B. amino acids
C. glucose phosphate
D. colloidal particles

23. The function of controls in experimentation is to

23. A. prevent errors
B. make evidence certain
C. ensure that a clear "yes" or "no" answer is obtained
D. provide a frame of reference for judging results

24. The enzyme rennin is secreted by the

24. A. stomach
B. pancreas
C. intestine
D. liver

25. In their passage through the digestive tract, fats are first acted upon by enzymes in the

25. A. mouth
B. stomach
C. small intestine
D. pancreas

26. Bile aids in the digestion of fats by

26. A. lowering the surface tension
B. initiating chemical breakdown
C. contributing lipase
D. contributing bile pigments

27. Enzymes acting on starch are

27. A. found in saliva
B. found in the stomach
C. produced by the spleen
D. produced by the large intestine

28. A person with type O blood may receive blood of type

28. A. O
B. AB
C. O, AB, A, B
D. A

29. Water absorption takes place mainly in the

29. A. mouth
B. stomach
C. small intestine
D. large intestine

30. Cellular absorption of glucose is accomplished through

30. A. cyclosis
B. osmosis
C. phosphorylation
D. diffusion

31. The most effective chemical factor in the control of breathing is

31. A. CO_2
B. O_2
C. N_2
D. hemoglobin

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32. Carbon monoxide is toxic because it

32. A. saturates the plasma
B. forms a stable compound with hemoglobin
C. prevents passage of red corpuscles through the capillaries
D. combines with oxygen in the tissues

33. In man, the lungs are caused to inflate by

33. A. relaxation of the diaphragm
B. contraction of the diaphragm
C. relaxation of the chest muscles
D. relaxation of abdominal muscles

34. Venous blood becomes arterial

34. A. in the lungs
B. in the tissues
C. when HbO_2 releases oxygen
D. when HCO_3^- is formed

35. During swallowing, the epiglottis prevents

35. A. air from passing into the esophagus
B. food from passing into the pharynx
C. air from passing into the pharynx
D. food from passing into the larynx

36. Fermentation is

36. A. the production of alcohol
B. the breakdown of sugar in the absence of oxygen
C. aerobic respiration
D. energy-production by bacteria and yeasts

37. ATP is

37. A. a respiratory enzyme
B. an energy acceptor
C. an hydrogen carrier
D. a phosphate donor

38. When a 0.05% methyl blue solution is added to a glucose-yeast suspension in a respirometer tube, the mixture turns

38. A. light blue
B. light yellow
C. colorless
D. dark yellow

39. When methylene blue combines with hydrogen it becomes

39. A. light blue
B. light yellow
C. dark yellow
D. colorless

40. Urea is produced in the

40. A. kidney
B. gall bladder
C. liver
D. spleen

41. Most of the energy-yield in respiration results from

41. A. fuel breakdown
B. conversion of glucose to pyruvic acid
C. hydrogen transfer
D. conversion of pyruvic acid to acetyl CoA

42. When a few drops of $BaCl_2$ are added to a $CuSO_4$ solution, there is a

42. A. white precipitate
B. light yellow precipitate
C. blue precipitate
D. black precipitate

43. Respiratory enzymes within a cell are concentrated largely in the

43. A. chromosomes
B. ribosomes
C. plastids
D. mitochondria

44. Proteins are formed from amino acids by

44. A. dehydration
B. dehydrogenation
C. hydration
D. hydrolysis

45. Genes function in protein synthesis as

45. A. enzymes forming peptide links
B. intermediate energy carriers
C. controllers of amino acid sequences
D. amino acid suppliers

46. A peptide link joins

46. A. amino groups of two amino acids
B. the amino group of one and the acid group of another amino acid
C. the acid groups of two amino acids
D. the amino group of one and the peptide group of another amino acid

47. In steady-state control, feedback is a necessary link between

47. A. effector and modulator
B. effector and receptor
C. receptor and modulator
D. two effectors

48. The addition of a few grains of an insoluble powdered dye to a drop of water is one way of illustrating

48. A. hydrolysis
B. osmosis
C. Brownian movement
D. plasmolysis

49. Redundancy in control operations

49. A. decreases the amount of error
B. increases the selectivity of modulators
C. nullifies the action of effectors
D. increases the hunting oscillation and overshoots

50. Benedict's solution is used to test for

50. A. amino acids
B. glycerin
C. reducing sugars
D. fatty acids

51. Specificity transfer from DNA to DNA probably occurs

51. A. whenever transfer to RNA occurs
B. only at the time of chromosome duplication
C. at any time in the life cycle of a cell
D. whenever proteins are synthesized in the ribosomes

52. RNA is found in

52. A. the nucleus only
B. the cytoplasm only
C. nucleus and cytoplasm
D. the mitochondria

53. Amino-acids are carried to ribosomes by

53. A. cytoplasmic DNA
B. nuclear DNA
C. messenger RNA
D. transfer RNA

54. For the study of the effects of enzymes on protein digestion, one of the materials needed is

A. glucose solution
B. potassium iodide
C. rennin junket powder
D. carbon tetrachloride

55. The hormone of the parathyroid gland regulates

A. thyroid secretions
B. calcium metabolism
C. growth
D. respiration

56. Adrenalin

A. increases heart rate
B. decreases heart rate
C. has no effect on the heart
D. affects only the heart

57. Clotting of blood

A. requires pepsinogen
B. results from fibrin joining with globulin
C. is the result of platelets releasing fibrinogen
D. depends on the formation of thrombin

58. Impulses through the vagus nerves

A. increase blood pressure
B. produce vasodilation in the carotid arteries
C. slow the heart
D. cause an increase in flow of blood into the vena cava

59. Pollen gives rise to

A. male gametophytes
B. female gametophytes
C. zygotes
D. polar nuclei

60. One blood component normally unable to pass into capsular urine during nephric filtration is

A. blood glucose
B. blood protein
C. water
D. urea

61. Glucose is

A. the end product of photosynthesis
B. a food
C. the storage form of carbohydrates in plants
D. synthesized in plants from starch

62. A chain of ganglia running along each side of the spinal cord

A. contains synapses of the sympathetic motor nerves
B. contains synapses of the parasympathetic motor nerves
C. contains the cell bodies of the motor nerves
D. must be present for sensation

63. A nervous impulse

A. is an electric current
B. is an energy-consuming process
C. travels with the speed of electricity
D. is due to diffusion of acetylcholine or adrenalin

64. The cerebellum is the center of

A. intelligence
B. sensory perception
C. motor coordination
D. vision

65. The cornea is a continuation of the

A. retina
B. sclera
C. choroid
D. iris

66. The organ of Corti is located in the

A. utricle
B. cochlea
C. saccule
D. middle ear

67. The internal organs of vertebrates are under control of the

A. central nervous system
B. spinal cord
C. autonomic nervous system
D. brain

68. Sexuality has adaptive value because it

A. ensures the continued existence of various species
B. produces new genetic combinations
C. allows for a greater rate of reproduction
D. makes mating possible

69. The large leafy fern plant is the

A. haploid sporophyte
B. haploid gametophyte
C. diploid gametophyte
D. diploid sporophyte

70. The production of a specific protein may be described best as

A. accumulation of molecules
B. enzyme-dependent synthesis
C. template and enzyme-dependent synthesis
D. self-duplication

71. During anaphase of mitotic divisions

A. asters disappear
B. centrioles divide
C. chromosomes migrate
D. nuclear membranes reform

72. A mature mammalian egg usually does not possess

A. cytoplasm
B. a nucleus
C. stored food
D. motility

73. The hormone progesterone which maintains the lining of the uterus during pregnancy is secreted by

A. cells of the testis
B. the follicle in the ovary
C. the corpus luteum in the ovary
D. the pituitary gland

74. Individuals carrying two of the same alleles are said to be

A. hybrids
B. dominant
C. haploid
D. homozygous

75. If the concentration of auxins is high

75. A. root growth is accelerated and stem growth is inhibited
B. root growth is inhibited and stem growth is accelerated
C. both roots and stems react in the same way
D. there is a strong effect on stem growth, but none whatsoever on root growth

76. Mendel's Law of Independent Assortment states that

76. A. there is a blending of heredity in each generation
B. allelic traits tend to mix
C. chromosomes are the carriers of hereditary material
D. nonallelic traits are inherited independently

77. If a normal body cell of the fruit fly Drosophila has eight chromosomes

77. A. each sperm has eight
B. the haploid number is eight
C. each egg has four
D. eight chromosomes go into each polar body

78. That evolution has occurred is

78. A. a working hypothesis
B. quite probable but hardly proved
C. supported by substantial evidence
D. impossible to prove, since it happened so long ago

79. In the absence of selective forces and mutations, the frequency of any given gene in a large population will

79. A. remain the same indefinitely
B. change slowly in some unpredictable direction
C. change slowly and predictably
D. always decrease, because of replacement

80. Proteins normally present in blood

80. A. represent foods in transit to cells
B. are formed from proteins absorbed from the gut
C. have no known function
D. are formed from amino acids absorbed from the gut

81. The first step in the utilization of glucose in metabolism consists of the formation of

81. A. ATP
B. glucose phosphate
C. pyruvic acid
D. high-energy bonds

82. Chemosynthesizers and photosynthesizers have in common that they

82. A. require light
B. possess chlorophyll
C. manufacture food
D. are all bacteria

83. The capsule of a nephron which contains the glomerulus

83. A. filters material from the blood
B. returns material to blood
C. carries only water
D. forms urea

84. Proteins consist entirely of

84. A. amino acids linked together
B. glycerol and fatty acids linked together
C. carbon, hydrogen and oxygen
D. phosphates and glycerol

85. Water is biologically vital because it

85. A. is covalent
B. has low density
C. dissolves many substances
D. is found everywhere

86. The mechanism by which enzymes act

86. A. involves breakdown of the enzyme
B. does not involve the enzyme in the reaction
C. is by temporary combination
D. is by loss of specificity

87. The movement of substances through living membranes is usually

87. A. impossible
B. very slow
C. by means of osmosis
D. by active transfer involving expenditure of energy

88. Molecules may react only when they

88. A. exchange energy
B. exchange atoms
C. are in water
D. are in contact

89. A solution with more OH^- ions than H^+ ions is

89. A. acid
B. alkaline
C. neutral
D. salty

90. Diffusion is

90. A. the loss of a material from protoplasm
B. the tendency of particules to become evenly distributed
C. of no significance in protoplasm
D. a substitute of osmosis

Values

SECTION B

Answer ANY THREE of Questions 91, 92, 93, 94, 95.
Diagrams may be used to supplement discussion.

20 **91.** Discuss cellular controls in maintenance of steady state.

FOR ROUGH WORK
(No marks given for work in this space)

(Additional space For Rough Work on page 12)

FOR FINISHED WORK

(Additional space For Finished Work on page 13)

FOR ROUGH WORK

(No marks given for work in this space)

FOR FINISHED WORK

[OVER]

Values

10 **92.** (a) Discuss how the blood glucose level in man is kept constant despite fluctuations in food supply and food utilization.

Values

10 (b) Describe the control mechanism which regulates the amount of food eaten by a mammal.

Values

2 **93.** (a) What are mutations?

4 (b) Briefly discuss the consequence of the majority of mutations.

8 (c) Briefly discuss the roles of mutations as related to the theory of evolution.

Values

6 (d) Of what significance is the Hardy-Weinberg Law in evolutionary theory?

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Values

9 **94.** (a) Discuss the nature, occurrence, and adaptive advantages of hermaphroditism.

2 (b) What is the principal function of meiosis?

Values

5 (c) How does meiosis differ in production of an animal egg and an animal sperm?

4 (d) Compare the advantages of gametic reproduction with those of sporulation.

Values

8 **95.** (a) Discuss the functions of the circulatory system in man.

4 (b) Explain why kidney transplants are frequently unsuccessful.

Values

4 (c) Explain how abnormal blood pressure and kidney malfunction may be related.

4 (d) Outline the procedure for measuring blood pressure in man.

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